Original Article ISSN (O):2395-2822; ISSN (P):2395-2814

Association of Serum HCG Level with Miscarriage in Early Pregnancy

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Received: September 2019
Accepted: October 2019

ABSTRACT

Background: Miscarriage is defined as spontaneous pregnancy loss prior to 24 weeks of gestation. The present study was conducted to determine association of serum hCG level with miscarriage in early pregnancy. **Methods:** The present study was conducted on 114 asymptomatic pregnant women with a gestation of 6 to 16 weeks reported to the department. Patients were followed upto 20 weeks or miscarriage was diagnosed by ultrasound scanning. Measurement of serum HCG was performed using the Siemens Immulite 2000 and results were expressed as mIU/ml. **Results:** The mean hCG in women with miscarriage was 45123.4 mIU/ml and in women without miscarriage was 92104.5 mIU/ml. The difference was significant (P< 0.05). The mean hCG level in women with miscarriage <10 days was 40125.2 mIU/ml. Women with miscarriage 10-20 days was 44982.7. The mean hCG level in women with miscarriage >20 days was 65427.8. The mean hCG level in women without miscarriage was 92104.5. The difference was significant (P< 0.05). **Conclusion:** There was low level of hCG in women with miscarriage than women without miscarriage.

Keywords: HCG, Women, miscarriage.

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INTRODUCTION

Miscarriage is defined as spontaneous pregnancy loss prior to 24 weeks of gestation. Miscarriage affects 10 to 20% of all clinically recognized pregnancies which end in miscarriage.[1] Prior to 6 weeks' gestation, most miscarriages result from cytogenetic abnormalities in the embryo such as chromosomal trisomy. However, later during gestation, other causes of miscarriage, such as placental insufficiency, intrauterine infection, and thrombosis, become more common. Abnormal placentation (placental development) is found in two-thirds of cases of miscarriage.[2]

Human chorionic gonadotropin (hCG) is a hormone produced by your placenta once an embryo implants in the uterus. The purpose of the hormone is to prepare body to continue to produce progesterone, which prevents menstruation from occurring. This protects the endometrial uterine lining and pregnancy. Standard hCG levels vary quite massively from woman to woman. This is because hCG levels really depend on what is normal for patient, how female body responds to pregnancy, as well as how many embryos patient is carrying. The way a woman's body reacts to pregnancy is entirely unique. In early pregnancy, hCG levels usually double every two to three days. Interestingly, when the measurements start off high they don't expand at the same rate. If they start off more slowly, the increase ends up happening much quicker.[3]

Human chorionic gonadotropin is a hormone produced primarily by syncytiotrophoblastic cells of the placenta during pregnancy. The hormone stimulates the corpus luteum to produce progesterone to maintain the pregnancy. Smaller amounts of hCG are also produced in the pituitary gland, the liver, and the colon. As previously mentioned, certain malignancies can also produce either hCG or hCG-related hormone. Trophoblastic cancers (hydatidiform mole, choriocarcinoma, and germ cell tumors) are associated with high serum levels of hCG-related molecules. The hormone itself is a glycoprotein composed of two subunits, the alpha and beta subunits. There are multiple forms found in the serum and urine during pregnancy including the intact hormone and each of the free subunits. HCG is primarily catabolized by the liver, although about 20% is excreted in the urine. The beta subunit is degraded in the kidney to make a core fragment which is measured by urine hCG tests.[4] The present study was conducted to determine association of serum hCG level with miscarriage in early pregnancy.

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MATERIALS & METHODS

The present study was conducted in the department of Obstetrics & Gynaecology. It comprised of 114 asymptomatic pregnant women with a gestation of 6 to 16 weeks reported to the department. Equal number of control was also included. All were informed regarding the study. Ethical approval was obtained from institute prior to the study.

General information such as name, age, gender etc. was recorded. Patients were followed upto 20 weeks or miscarriage was diagnosed by ultrasound scanning. Measurement of serum HCG was performed using the Siemens Immulite 2000 and results were expressed as mIU/ml. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table 1: Analysis of the HCG among patients

hCG (mIU/ml)	Women with Miscarriage	Women without miscarriage	P value
	Mean	Mean	
	45123.4	92104.5	0.01

[Table 1], graph I shows that mean hCG in women with miscarriage was 45123.4 mIU/ml and in women without miscarriage was 92104.5 mIU/ml. The difference was significant (P< 0.05).

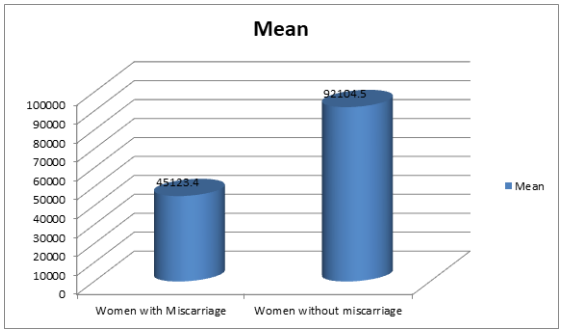

Figure 1: HCG among patients

Table 2: Serum hCG level in different time of miscarriage

Groups	Mean	P value
Women with Miscarriage <10 days	40125.2	0.04
Women with Miscarriage 10-20 days	44982.7	
Women with Miscarriage >20 days	65427.8	
Women without miscarriage	92104.5	

[Table 2 & Figure 2] shows that mean hCG level in women with miscarriage <10 days was 40125.2 mIU/ml. Women with miscarriage 10-20 days was 44982.7. The mean hCG level in women with miscarriage >20 days was 65427.8. The mean hCG level in women without miscarriage was 92104.5. The difference was significant (P< 0.05).

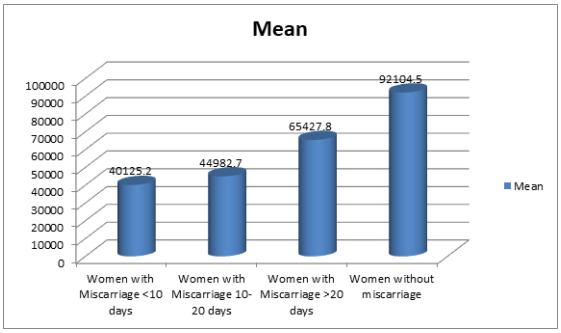

Figure 2: Serum hCG level in different time of miscarriage

DISCUSSION

Women affected by miscarriage not only suffer devastating emotional consequences but are also at increased risk of developing serious antenatal morbidities such as preeclampsia and preterm delivery during subsequent pregnancies.[5] Therefore it is important to develop simple and safe test to identify pregnancies at high risk of miscarriage, because this could improve the diagnostic accuracy and potentially improve obstetric outcomes. Although it is clear that low levels of hCG around days 12–16 after conception (fourth week of gestation) are associated with preclinical early pregnancy loss, the precise relationship between early hCG levels and clinical (later) miscarriage remains uncertain.[6] Previous studies have generally grouped clinical miscarriages with preclinical early pregnancy loss and ectopic pregnancies as a single outcome and have not separated twins from the analysis. Twins would introduce a significant bias because they are associated with higher early hCG levels and rates of clinical miscarriage may be different from those of singletons.[7]

Although an association between low hCG and an increased risk of preclinical pregnancy losses in IVF pregnancies has been well established, the relationship with clinical miscarriage has remained, until now, relatively obscure because prior reports have grouped preclinical loss, clinical pregnancy loss, and ectopic pregnancies as a single outcome. Although these outcomes have been grouped as "nonviable," they did separately report day 12 hCG values among a cohort undergoing a clinical miscarriage and found them to be at half the values of those who had viable pregnancies.

The present study was conducted to determine association of serum hCG level with miscarriage in early pregnancy. In this study we found that mean hCG in women with miscarriage was 45123.4 mIU/ml and in women without miscarriage was 92104.5 mIU/ml. The difference was significant (P< 0.05). Buchmayer et al,[8] conducted a retrospective

study of 1,054 women who underwent in vitro fertilization and achieved an ultrasound-confirmed live singleton pregnancy with cardiac activity. The incidence of miscarriage diagnosed at 8–19 weeks +6 days of gestation was estimated in these 3 subgroups according to their hCG concentrations at day 16 after conception: less than the 25th, 25th–75th, and more than the 75th percentiles. The overall incidence of miscarriage was 11.1% (117/1,054), and the median gestational age at diagnosis was 10 weeks and 4 days. The median (95% confidence interval) day 16 hCG level in the miscarriage group was 182 mIU/mL (157–211), significantly lower than the median level in those who had an ongoing pregnancy (223 mIU/mL [213–233], P < .003). There was an increasing risk of miscarriage associated with decreased hCG levels (8.0% at > 75th percentile; 9.9% at 25th–75th percentiles; 16.7% at < 25th percentile.

Jayasena, et al,[9] found that hCG was lower only in women who experienced miscarriage when compared with unaffected pregnancy. If blood measurement was within 3 weeks prior to the diagnosis of miscarriage (hCG in international units per liter × 1000: 85.1 ± 39.3, no miscarriage; 17.2 ± 21.6, miscarriage < 7 d, P <.05, vs no miscarriage; 51.8 ± 55.6, miscarriage 7–21 d, P <.05, vs no miscarriage; 63.8 ± 37.0, miscarriage > 21 d, P = NS, vs no miscarriage.

We observed that mean hCG level in women with miscarriage <10 days was 40125.2 mIU/ml. Women with miscarriage 10-20 days was 44982.7. The mean hCG level in women with miscarriage >20 days was 65427.8. The mean hCG level in women without miscarriage was 92104.5. Bhattacharya et al9 found that the median level for hCG was 87351.00 mIU/ml (range 12836.00 - 269800.00). The mean level of serum hCG in women without miscarriage (N=165) 97137.53±53745.46 mIU/ml and women with miscarriage (N=13) 48725.31±21933.20 mIU/ml (P<0.002). Further distribution of women with miscarriage (N=13) according to time to diagnosis (days) into three group [<10days (N=3) 44016.67±28495.53, 10-20days (N=8) 45903.25±21413.01,>20days (N=2) 67076.50±11636.86].

Serum tests for hCG are immunometric assays. This means that they use two antibodies that bind to the hCG molecule, a fixed antibody and a radiolabeled antibody which adhere to different sites on the molecule, sandwiching and immobilize the molecule to make it detectable.[3] Assays involve washing away the excess serum components and measuring the amount of remaining labeled hCG to give a quantitative result. There are more than 100 different assays commercially available which results in significant variability in reported values. Urine assays are similar, although many detect total hCG levels greater than 20 mIU/mL. Many over-the-counter urine pregnancy tests do not detect hyperglycosylated hCG, which accounts for most of the hCG in early pregnancy, resulting in a wide range of sensitivities of these tests.[11]

CONCLUSION

Authors found that there was low level of hCG in women with miscarriage than women without miscarriage.

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How to cite this article: Singhal S, Bhushan S. Association of Serum HCG Level with Miscarriage in Early Pregnancy. Ann. Int. Med. Den. Res. 2019; 5(6):OG23-OG25.

Source of Support: Nil, **Conflict of Interest:** None declared